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ABSTRACT

The purpose of this investigation was to evaluate the effects of a systematic auditory training program on the auditory discrimination ability and reading readiness of 55 white, middle/upper middle class kindergarten students. Following pretesting with the "Wepman Auditory Discrimination Test," "The Clymer-Barrett Prereading Battery," and the "S.R.A. Tests of General Ability, K-2," 22 students took 30 quarter-hour auditory training lessons, while the 33 control subjects had 30 quarter-hour story periods. Posttests were performed with using alternate forms of the pretest instruments. No significant difference in the growth of auditory discrimination ability was found between groups, across sex, or for time of training (morning/afternoon). Results also indicated no significant difference in the growth of reading readiness between training and control groups or between the morning and afternoon training groups; however, a significant difference was discovered between males and females, with males making significant gains. These results suggest that no specialized auditory instruction is needed when middle class white children come to school with adequate language backgrounds, average intelligence, and adequate or above average auditory discrimination. (RL)

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AUDITORY TRAINING AND ITS EFFECTS UPON THE AUDITORY DISCRIMINATION AND READING READINESS OF KINDERGARTEN CHILDREN

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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CHAPTER I

THE PROBLEM

Background of the Problem

The problem of identifying the readiness factors related to first grade reading achievement is not new. Thorndike's (1914) interest in the general readiness for learning and his formulation of his "law of readiness" sparked much attention to the study of readiness for the specific task of reading (Dykstra, 1966).

One of the first major studies of reading readiness was conducted by Deputy (1930) who developed a formula for predicting first grade reading achievement from scores of mental maturity, certain verbal and auditory skills, context comprehension and recall. Since that early study, others have been designed attempting to isolate readiness factors. Most have been concerned with such predictive factors as intelligence, various auditory and visual characteristics, maturity, language facility, and other related abilities (Gates, 1940; Gates & Bond, 1936; Kopel, 1942).

One ability receiving much attention in recent years is auditory discrimination. Research has shown that poor auditory discrimination is characteristic of retarded readers

(Blank, 1968; Christine & Christine, 1964; Thompson, 1963) as well as of lower socioeconomic and ethnic groups (Arnold & Wist, 1970; Deutsch, C., 1972; Karger, 1973; Merrell, 1969). It is significantly and positively correlated to reading skills and reading readiness (Christine & Christine, 1964; Dykstra, 1966; Morency & Wepman, 1973).

More research, however, is needed to expand the current knowledge of auditory discrimination and its relationships with the various aspects of the reading field. Dykstra (1966) has indicated this need:

> A major proportion of the research assessing the relationship of auditory discrimination abilities with reading achievement has been correlational in nature. Experimental studies are now needed. Groups comparable in these abilities at the beginning of first grade should be treated differentially, with one group receiving instruction directed at improving auditory discrimination while the other group is given prereading instruction of a placebo nature. Equalizing the time spent in direct instruction in reading while varying the nature (but not the extent) of the readiness training would make possible less ambiguous statements regarding the influence of auditory discrimination abilities on subsequent achievement in reading (p. 33).

While many studies have been made with minority and low socioeconomic groups, few controlled studies involving white middleclass kindergarten children have been undertaken.

Statement of the Problem

The purpose of this investigation was to evaluate the effects of a systematic auditory training program upon the auditory discrimination and reading readiness of kinder-

garten students. An evaluation of these effects was also made for groups arranged according to sex and time of the day when auditory training was given.

Hypotheses

The following hypotheses guided the investigation:

1. There will be no significant difference in the growth of auditory discrimination ability of the kindergarten students who received auditory training and those who did not receive training.

2. There will be no significant difference in the growth of auditory discrimination ability of the male and female kindergarten students who received auditory training.

3. There will be no significant difference in the growth of auditory discrimination ability of the kindergarten students who received auditory training in the morning and the kindergarten students who received auditory training in the afternoon.

4. There will be no significant difference in the growth of reading readiness of the kindergarten students who received auditory training and those who did not receive training.

5. There will be no significant difference in the growth of reading readiness of the male and female kindergarten students who received auditory training.

6. There will be no significant difference in the growth of reading readiness of the kindergarten students who received auditory training in the morning and those kindergarten students who received auditory training in the afternoon.

Importance of the Study

Auditory ability is an important mode in learning throughout a person's life. As a baby matures he listens to the sounds made around him and learns to communicate by speaking. In order to be understood the child must produce correct speech sounds in established orders to form words. It is essential that he is able to discriminate the gross and fine differences between the sounds or he will be unable to correctly reproduce the desired sounds he needs. The child's acquisition of speech sounds follows an established pattern and the child has usually acquired the more difficult sounds by the age of 8 (Poole, 1934; Wepman, 1960).

By the time a child enters school he usually has developed an adequate speaking vocabulary. Auditory discrimination skill plays an important role in school especially when instruction in reading and phonics begins. In reading and phonics a child must look at a letter and be able to say the appropriate sound. An incorrect phoneme-grapheme match can alter the meaning of what was intended;

examples of this are pin, pen, and pan.

Auditory discrimination is a prime mode of learning involved in teaching reading and phonics. In beginning reading or remedial reading instruction, a teacher or clinician is wasting valuable time and effort in teaching phonics if the training is not grounded in adequate auditory discrimination skills (Zaeske, 1975). Phonics is an auditory as well as a visual skill. The ear is an important part of the secret to success.

Some methods of teaching reading, especially those utilizing a direct one-to-one correspondence such as the Initial Teaching Alphabet (I.T.A.), require good auditory discrimination ability. Here the instructional emphasis is on pronouncing the appropriate sound for each symbol in a word; reading by sight is minimized. Each symbol is taught as a sound prior to its introduction into words. Without good auditory discrimination many mistakes can easily be made.

The findings of this study may be useful for the design of future instructional practices in the kindergarten program. If the training program improves auditory discrimination and/or reading readiness it may be worthwhile to incorporate it as a standard part of the kindergarten curriculum, thereby perhaps eliminating or lessening future phonic and reading problems.

Additionally, classroom teachers may use the results and procedures described in the study to evaluate their students' auditory difficulties and prescribe individualized training programs and procedures directly focusing on specific discrimination difficiencies.

Definition of Terms

Auditory discrimination-the ability to distinguish between phonemes or individual sounds used in speech (Wepman, 1960). It is in this context that the term is used in this investigation unless otherwise indicated. Operationally defined, the expression refers to the score achieved on the Wepman Auditory Discrimination Tests.

Reading Readiness-general development resulting in physical, mental, and emotional preparedness for a given type of reading program (Betts, 1950). Operationally defined, the raw scores achieved on the Clymer-Barrett Prereading Battery will indicate readiness.

Intelligence-a term referring to the mental or learning ability of a child (Fry, 1972). Operationally defined, the intelligence quotient achieved on the SRA Tests of General Ability will indicate intelligence.

Limitations of the Study

The findings of this study should be interpreted

in light of the following limitations.

1. Fifty-five white middle to upper-middle class kindergarteners participated in this investigation. Because of the characteristics of this relatively small population, caution should be exercised when generalizing the results of this study to large groups with similar or dissimilar backgrounds.

2. The short attention span and occasional restlessness of some of the children may have influenced the results.

3. A third limitation pertains to the criteria for participation in the study (no speech therapy or hearing defects, successful completion of the auditory pretest, and passing the validity requirements of each auditory test). Generalizing the results may be restricted because kindergarten populations in public schools include many children who do not meet these criteria.

4. Additionally, the training program itself poses a limitation. The length and duration of the training sessions (15 minutes/day for 30 sessions) represents a concentrated effort to improve auditory discrimination skills. The data was obtained immediately upon the completion of the training program and any gains achieved may not have lasting effects over an extended period of time.

5. Finally, the testing of auditory discrimination was limited to performance on a very specific task, the

making of same-different judgments of isolated minimal speech pairs. Other important areas of auditory discrimination such as pitch discrimination and masking were not considered in this study.

CHAPTER II

REVIEW OF THE LITERATURE

Recent years have presented educators with a great number of research studies expanding their knowledge of the field of auditory discrimination in such areas as reading, socioeconomic level, intelligence, sex, and race. The literature presented in this chapter is arranged under the following subheadings:

A) The Developmental Nature of Auditory Discrimination

B) The Relationship of Auditory Discrimination to Articulatory Defects

C) Auditory Discrimination, Reading Readiness, and Reading

D) Socioeconomic Status, Race, Dialect, and Auditory Discrimination

E) Sex and Auditory Discrimination

F) The Relationship between Intelligence and Auditory Discrimination

G) The Effects of Auditory Training

H) Summary

The Developmental Nature of Auditory Discrimination

Audition, the ability to hear, develops sequentially on at least three levels (Wepman, 1960). There is both a sequence of development in the acquisition of the three levels and within each level. First to develop is acuity. This is the ability of the ear to collect environmental sounds and transmit them to the nervous system. Second is understanding, the ability of the nervous system to extract and interpret meaning from the sound patterns transmitted to it, while the last to develop is the level of discrimination and retention. These are the abilities which enable the individual to differentiate each sound from every other sound and to hold each in mind long enough for the individual to moderate his speech or to make accurate phonic comparisons.

Very early in life the infant is able to react to gross differences in sounds. As he matures, he is able to make finer and finer distinctions between auditory patterns until he can identify and distinguish each sound in his environment and language. With this development his speech becomes more and more like the speech of the community in which he lives (Mussen, Conger & Kagan, 1974; Poole, 1934; Wepman, 1960).

The general maturational development of discrimination ability is indicated by the improvement of discrimi-

nation with increasing age (Bradford, 1954; Deutsch, C., 1972; Deutsch, M., 1963; Karger, 1973; Merrell, 1969; Morency & Wepman, 1973; Shaw, 1972; Templin, 1954; Thompson, 1963; Wepman, 1960; Wilcox, 1969). Limited discrimination ability is characteristic of kindergarten and first grade children while accurate discrimination ability is more characteristic of second grade children (Thompson, 1963). This ability is not fully developed in some children until forth grade (Morency & Wepman, 1973).

Blind children were found to have significantly superior discrimination abilities when they were compared with sighted and deaf children and sighted children were found to have significantly superior discrimination abilities when they were compared with deaf children (Larsen, 1971). The superiority of the blind children's performance on tests of auditory discrimination ability indicated the importance of an individual's early experience as a listener and producer of verbal stimuli. The blind child must develop, at an early age, communication skills that will enable him to manipulate his environment and compensate for his sensory impairment. Thus, early training in learning to recognize and produce speech sounds may account for the difference in abilities among the sighted, deaf, and blind children (Larsen, 1971).

Doehring and Rabinovitch (1969) found that children

who were classified as learning disabled showed a tendency to be deficient in all abilities involving discrimination and perception. Similarly, the child who is classified as a slow learner or "backward" may also be deficient in auditory discrimination skills (Burt, 1950; Johnson, 1963).

The Relationship of Auditory Discrimination to Articulatory Defects

It is generally accepted that sound acquisition in the speech of children is progressive in nature (Mussen et al., 1974; Poole, 1934; Wepman, 1960). Boys and girls develop efficiency of articulation at about the same rate from the age of 2½ to 5½ years of age. From this point, girls show more rapid growth. At 6½ years girls approach efficiency in articulation, while boys require an additional year, until 7½ years of age, to reach the same degree of efficiency (Poole, 1934). A normally developing child, both physically and mentally, reaches maturity of articulation by age 8 (Poole, 1934; Wepman, 1960). This pattern of acquisition may result from the developing process of auditory discrimination (Wepman, 1960).

As auditory discrimination develops, more and more speech sounds become available to the child. Weiner, Wepman, and Morency (1965) found a significant relation between auditory discrimination ability and the acquisition and

development of speech and Johnson (1963) considers auditory discrimination essential in the production and development of good speech.

Observations of many children in clinical speech situations have shown that some children do not develop the ability to make fine aural distinctions until they reach the age of 7 or 8, the age at which auditory discrimination ability is mature in most children (Wepman, 1960). Articulatory speech defects in children may result from various causes. Among these are intellectual defects, hearing defects, psychogenic defects like infantilism, or physical (structural) defects. Such defects account for only 20% of all articulatory defects of childhood. Auditory discrimination, it is believed, accounts for most of the others (Wepman, 1960).

Children who have articulation problems tend to mature more slowly in auditory discrimination ability than children who do not have articulation disorders and there is a significant difference in the auditory discrimination ability of the children who have articulation disorders and the auditory discrimination ability of children who are free from such disorders (Burt, 1950; Christine & Christine, 1964). Additionally, a strong positive significant relationship has been shown to exist between children who are retarded in reading and children who have articulatory dis-

orders (Wepman, 1960).

Children with poor articulation at an early school age are likely to be those with poor auditory discrimination (Christine & Christine, 1964, Wepman, 1960). Many of these children will develop better discrimination and speech during the first two years of school without speech therapy (Wepman, 1960).

Auditory Discrimination, Reading Readiness and Reading

Included in the vast amount of research devoted to reading readiness and reading achievement are a number of studies which report predictive relationships of performance on specific auditory tasks and subsequent reading success. The majority of the research devoted to predictions concerning auditory discrimination is based on first grade samples.

Research in the field of reading readiness suggests that many important factors are involved in predicting reading success (Gates, 1940; Gates & Bond, 1936; Ingram, 1953; Kopel, 1942; Robinson & Hanson, 1968; Thackray, 1965). One of these factors is auditory discrimination.

In England, Thackray (1965) assessed the relationships between reading readiness factors and reading progress and found of all the various subskills, auditory discrimination correlated most highly (.529 and .531) with reading

achievement.

Studies of American first grade students comparing auditory discrimination with reading achievement yielded similar results with few correlations reaching the .60's (Carhart, 1970; Durrell & Murphy, 1953; Dykstra, 1966; Dyson, 1973; Morgan, 1971). Olsen (1963) reported that the ability to hear sounds in words ranked .67 with reading achievement while Durrell and Murphy (1953) concluded that the ability to notice the separate sounds in words is highly important in determining a child's success in learning to read. Nila (1953) concluded that auditory discrimination ability has the greatest relation to first grade reading and this ranking agrees with the results reported by Bruininks (1969) and Durrell, Murphy, & Junkins (1941).

Two longitudinal studies of intermediate grade children are worth noting. In an initial study, Morency and Wepman (1973) concluded that the perceptual development of a child in grade one at the age of six has a continuing influence through grade three at age eight. At the intermediate level, auditory discrimination scores for a sample remained related to almost every subtest of the Metropolitan Achievement Tests with the exception of the Parts of Speech subtest for grades 5 and 6; however, the correlations remained low ranging between .19-.38. The experimenters concluded that a child whose perceptual

development is slow when he enters school does not "catch up" in achievement even though his perception is fully developed by age nine.

Lester and Wheeler (1954) computed correlations within the .31-.40 range for auditory discrimination and silent reading and concluded that at the intermediate level a substantial relationship does not exist between the two variables. They also concluded that the use of auditory discrimination in developing silent reading skills does not increase at the intermediate level.

Another method of determining the relation of auditory discrimination skills to reading ability has been to investigate the differences in the auditory functioning of groups of children whose reading achievement is highly dissimilar. Bond (1935) using this technique with 2nd and 3rd graders found significant differences in the performances of normal and retarded readers on the tests of auditory blending and auditory perception. More specifically, significant differences were found between the groups in auditory discrimination. Retarded readers tended to be deficient in auditory discrimination skill.

Results from additional studies which have investigated this relationship with primary and middle grade children indicate similar significant differences in discrimination ability between retarded readers and students reading

at or above grade level (Blank, 1968; Bond, 1935; Christine & Christine, 1964; Deutsch, M., 1963; Dykstra, 1966; Harrington & Durrell, 1965; Monroe, 1935; Thompson, 1963; Wepman, 1960; Wilcox, 1969). In each instance, retarded readers tended to be deficient in auditory discrimination ability.

With intermediate grade students the results are less consistent. Wilcox (1969) and Weiner, Wepman, and Morency (1965) found significant differences for fourth grade students but Lovel and Gorton (1968), Templin (1954), and Reynolds (1953) found no significant differences between normal and retarded fourth grade readers.

Socioeconomic Status, Race, Dialect, and Auditory Discrimination

It has been suggested (Beck & Saxe, 1965; Deutsch, C., 1964, 1968, 1972; Deutsch, M., 1963; Silvaroli & Wheelock, 1966) that the environment of the lower class child who is typically the poorer reader is an important factor in his development of auditory discrimination skills. Some researchers maintain that experience in the lower class home is limited and language is used in the most restricted and concrete sense (Deutsch, C., 1964, 1968; Deutsch, M., 1963). Within an economically deprived home, there may be much noise but relatively little emphasis on verbal inter-

action and directed and sustained speech. Much of the communication is non-verba and verbal communication is likely to be terse, grammatically incorrect, and monotonous in structure and vocabulary (Deutsch, C., 1964; Deutsch, M., 1963). Not only does the environment affect the amount and variety of stimuli to which the child is exposed, it also influences the type and amount of practice he gets in learning to discriminate sounds from each other (Deutsch, C., 1972, Deutsch, M., 1963).

If this is so, a child raised in this restricted atmosphere might well be deficient in his discrimination and recognition of speech sounds (Beck & Saxe, 1965; Deutsch, C., 1972; Deutsch, M., 1963; Silvaroli & Wheelock, 1966). Attentiveness to discriminatary clues is less likely to develop, and the disadvantaged child may enter school poorly prepared to face the auditory demands of the classroom, especially the unfamiliar speech of the teachers and the need to attend to lengthy speech sequences (Beck & Saxe, 1965; Clark & Richards, 1966; Deutsch, M,. 1963). He is further likely to have difficulty with other skills such as reading which are partially dependent upon auditory discrimination (Deutsch, C., 1972).

Disadvantaged preschool children exhibit significant differences in auditory ability when compared with advantaged preschool children (Clark & Richards, 1966;

Giebink & Marden, 1968). Similar results were obtained by Deutsch (1972) who compared low and middle class Black and white 1st, 3rd, and 5th graders. Her results confirmed the expectation that poor auditory discrimination is one factor distinguishing lower socioeconomic children from middle socioeconomic children. This relationship decreased with age possibly reflecting gains in general discrimination ability learned in school experiences (Deutsch, 1972). These results were consistent with those of Merrell (1969) and Deutsch (1963).

Several investigators have found that the positive relationship between auditory discrimination and reading for middle class subjects applies to lower class subjects as well (Butenica, 1968; Deutsch, C., 1972; Katz & Deutsch, 1964; Robinson & Hanson, 1968; Weiner et al., 1965). This positive relation is strongest in the 1st grade and decreased as age increased (Deutsch, C., 1972; Deutsch, M., 1963; Politzer, 1971). Deutsch (1972) suggested that it is at the most significant phase of learning to read, the beginning, that auditory discrimination ability is critical.

The relationship between auditory discrimination and race seems to be consistent from study to study and race to race. Whites consistently exhibit superior auditory discrimination and reading achievement when compared with Blacks (Deutsch, C., 1972; Karger, 1973; Merrell, 1969;

Morgan, 1971; Shaw, 1972). Deutsch (1972) suggests that in the case of lower socioeconomic Black and white homes the Black homes may be more disadvantaged than the white homes creating greater differences between the groups.

Arnold and Wist (1970) examined the auditory discrimination ability of disadvantaged Anglo-American and disadvantaged Mexican-American children aged 5.6-9.5 and obtained significant results on an experimental discrimination test. The Anglo-Americans consistently performed at a higher level in all age groups. It was concluded that the auditory discrimination ability of the disadvantaged Mexican-American children appeared to be consistently more underdeveloped. Further, it seemed reasonable that subgroupings like the American Indians, Mexican-Americans or Cajun-Americans may have different types of problems in auditory discrimination because of low socioeconomic status and their early learning of a language other than English.

Further research assessing the effects of ethnic goup membership was undertaken by Ross (1974) who investigated the Anglo, Black, and Chicano. The three groups did not significantly differ in performance on the Wepman (standard English) but did differ in performance on the Gross Discrimination Test (Black English) and the Jott Discrimination Test (Spanish). Here again, it was concluded that the primary language effects the listener's ability to

discriminate.

The conclusion that dialect seems to play a role in the performance of auditory discrimination is reinforced by the studies of Fillyaw (1975) who used a multiracial population, Shaw (1972) and Wilcox (1969) who used standard English and Black English speakers, and Karger (1973) who used low socioeconomic Blacks and whites. Each experimenter found superior performances by the standard English speakers at each grade level as well as the general improvement in discrimination skill with age.

Sex and Auditory Discrimination

Conflicting results have been found when male and female students are compared. Osborn (1974) found no significant differences between kindergarten girls and boys on auditory perception measures including auditory discrimination. Similarly, Morgan (1971) discovered that sex made negligible influences on auditory ability and reading achievement of 1st graders while Hendrex (1968) and Wepman (1960) agree.

This result is not consistent with the findings of Dykstra (1966), Dyson (1975), and Thackray (1965). In each study the girls showed significant superiority over the boys in auditory discrimination ability. Dykstra (1966) also found that the girls were superior in reading achieve-

ment.

Few studies comparing the findings for boys and girls upon the conclusion of auditory training programs were found. The results are inconsistent. When the auditory benifits of structured vs. unstructured kindergarten readiness programs were compared, Moe (1972) found no sex differences. This result was not found by Evans (1971) who contrasted a classroom auditory program, a physical education program and a control class. Girls achieved significantly higher than boys in the classroom auditory program. Williams (1973) found no significant differences when Black and Mexican-American low socioeconomic girls and boys were compared.

The Relationship between Intelligence and Auditory Discrimination

Research in general indicates that auditory discrimination is not highly correlated to intelligence (Bradford, 1954; Deutsch, C., 1964; Dykstra, 1966; Dyson, 1975; Lester & Wheeler, 1954; Wepman, 1960). The low correlations vary from study to study. Dykstra (1966) compared the results of various reading readiness auditory discrimination measures and the Lorge-Thorndike Intelligence Tests (a nonverbal test) of all socioeconomic level 1st grade groups and reported few correlations exceeding .40.

Wepman (1960) found little relation between the

Kuhlmann-Anderson Intelligence Test and his own discrimination test. He stated that the better performance of the more intelligent child can be easily explained. To a small degree, attention to the auditory task is necessary for discrimination to function at its best. A child with high intelligence attends to his task better and consequently scores better on the test. But the fact that the correlation is low (.32) points to the comparative independence of discrimination from intelligence. Another explaination is presented by Blank (1968) who stated that there may be some cognitive processes involved in the performance of discriminating.

Similar results were achieved by Deutsch (1964) when comparing the Wepman, WISC subtests and the Peabody Picture Vocabulary Test (PPVT) scores for 1st and 5th grade Black students. Normal and retarded 5th grade readers were also contrasted. Correlations with the Lorge Thorndike for the 5th and 1st grades were very low, .24 and .14 respectively while the PPVT (a verbal test) correlated .50. Correlations for the retarded readers ranged from -.23 to .61 while the normal readers' correlations ranged from -.29 to .39 on the WISC subtests. It was found that the Wepman correlated with verbal measures but not with nonverbal or performance ones. Additionally, more significant relations were found between Wepman and verbal measures for retarded

readers than for normal readers.

Thompson (1963) reported high correlations between 1st grade scores of the Wepman and WISC; however, correlational data was not provided.

At the intermediate level low correlations of .38-.46 were found when intelligence was correlated with the auditory discrimination test prepared by Lester and Wheeler (1954).

From the results achieved by Valdes (1971) it appears that the intelligence of low socioeconomic children can be improved through auditory training.

The Effects of Auditory Training

The need to provide beginning reading students with adequate readiness skills in order to prevent future learning problems has been as area of concern to those responsible for the education and mental health of elementary students (Irvin, 1975). The literature is abundantly supplied with reports which showed that a significant relationship exists between reading achievement and visual and auditory skills. While the relationship of visual perception to reading and the outcome of visual perception training procedures has received considerable attention from researchers, studies assessing the effects of auditory training procedures upon the reading and reading readiness of children have been

scarce. There are, however, many divergent opinions as to the most efficient approaches to train and/or remediate auditory perceptual skill deficiencies (Axelrod, 1972).

Auditory discrimination is usually improved through helping the children distinguish the differences between sounds (amplitude, pitch, and quality). These activities are usually initiated with sounds that are grossly dissimilar. As the child can make the appropriate selections indicating a grasp of the principle involved as well as the ability to make differentiations at this level, sounds are presented of a successfully more similar nature requiring finer and finer discrimination. Rhythms and songs, and listening to records and rhymes also contribute to the improvement of performance in this area (Johnson, 1963).

Moe (1972) investigated the extent to which various types of standard reading readiness subtests measure unique aspects of auditory discrimination among kindergarteners and the extent to which different auditory training programs would influence the relation of subtest scores. Two schools utilizing highly dissimilar readiness programs were chosen to participate. One system classified as "structured" strictly taught readiness from a curriculum guide. The other system was classified as "unstructured", here there was no guide and the teachers were free to provide instruction at their own discretion.

It was discovered that the unstructured readiness students produced significantly superior performances in beginning consonant sounds whereas the structured readiness students were significantly superior in sound symbol relationships. Moe concluded that, in general, the readiness subtests did not appear to measure unique aspects of auditory discrimination of either boys or girls and the nature of the kindergarten program had little bearing on the interrelationships of auditory discrimination. He also concluded that the auditory skills of the subjects developed independently of their readiness instruction. Finally, there was no sex differences in the results of this study.

An alternate method of improving auditory discrimination skills was attempted by Harckham and Hagen (1970) who hypothesized that phonics training would improve both the auditory discrimination and reading readiness of kindergarten students. The results obtained from their middle to uppermiddle class sample indicated that phonics did not significantly improve discrimination but did improve reading readiness scores.

In a study using low socioeconomic 1st grade students, phonics instruction by tapes yielded similar results as an experimental auditory perceptual training program composed of systematically sequenced tape recorded lessons (Axelrod, 1972). Auditory discrimination in both cases significantly

improved but no improvement was reported in reading readiness.

Evans (1971) designed a sequentially planned physical education program on auditory discrimination abilities as well as a sequential auditory discrimination program of classroom learning experiences for kindergarten students. Both verbal and nonverbal discrimination was found to be significantly related to reading readiness. Verbal had the highest relationship and girls achieved higher on all variables. The correlations were low but fell within the range of other studies.

Kaleita (1975) discovered auditory discrimination can significantly be improved through instruction based on the Auditory Discrimination in Depth Program (ADD) using kindergarten children who meet the established level of poor discrimination performance. Reading Readiness was not improved.

Roberts (1975) using the same program with normal and educationally handicapped primary students was unable to detect the effects of the program on auditory discrimination, auditory conceptualization abilities, or reading achievement upon the completion of the program and eight weeks thereafter.

Auditory training of kindergarten disadvantaged children does produce significant gains in auditory ability (Valdes, 1971). Those who benefit most are the children

whose auditory discrimination abilities are underdeveloped according to the Wepman norms (Durrell & Murphy, 1953; Valdes, 1971). The findings suggested that training does not significantly improve reading readiness but does significantly improve intelligence scores (Valdes, 1971).

Low socioeconomic first grade children profit equally from auditory training of known words or nonsense words (Silvaroli & Wheelock, 1966).

A three year longitudinal study, beginning at grade 1, of Black and Mexican-American low socioeconomic students failed to significantly confirm the benefits of a phonics reading program, a visual-linguistic reading method, or a visual-linguistic reading method including auditory training. Neither auditory discrimination nor reading achievement were improved. No differences in race or sex were found (Williams, 1973).

Upon the conclusion of an auditory training program, low achieving early elementary predominantly Black children achieved adequate auditory discrimination development and significantly improved academic achievement in all areas tested by the Stanford Achievement Test and the Peabody Individual Achievement Test with the exception of one administration of the reading subtest (SAT) and the General Information Subtest (PIAT) (Lewis, 1975). Students appeared to foster greater expression of individual skill levels as

demonstrated by the greater variance of the trained ([illegible] dren on all measures (Lewis, 1975).

Feldmann, Schmidt, and Deutsch (1966) reported no general overall superiority of any of the following methods: an auditory program, a reading program, or a reading program including auditory training. Their third grade Black and Puerto Rican socially disadvantaged retarded readers did not increase auditory discrimination ability or reading with the immediate, 6 month or 1 year posttest scores.

At the intermediate level experiemntal results have indicated that an auditory training program involving records and 36 lessons with sound and word games did not significantly improve auditory discrimination abilities of educable mentally retarded children (Appell, 1972).

Summary

Auditory discrimination is developmental (Bradford, 1954; Deutsch, C., 1972; Deutsch, M., 1963; Karger, 1973; Merrell, 1969; Morency & Wepman, 1973; Shaw, 1972; Templin, 1954; Thompson, 1963; Wepman, 1960; Wilcox, 1969) and matures in most children by the end of the primary school years (Thompson, 1963; Wepman, 1960). Blind children have significantly superior discrimination abilities when they are compared with sighted and deaf children perhaps due to the blind child's early learning to recognize and produce speech

sounds necessary for communication and the manipulation of his environment (Larsen, 1971). Children with learning disabilities and those labeled as slow learners or "backwards" show a tendency to be deficient in discrimination ability (Burt, 1950; Doehring & Rabinovitch, 1969; Johnson, 1963).

Children who have functional articulation problems tend to mature more slowly in auditory discrimination ability than children with normal speech (Christine & Christine, 1964). A significant difference has been shown between discrimination and speech defects (Christine & Christine, 1964; Wepman, 1960). Often these children make corrections in their own speech efforts as their auditory discrimination matures (Wepman, 1960).

It is generally agreed that auditory discrimination is one important aspect of the beginning reading task (Gates, 1940; Gates & Bond, 1936; Kopel, 1942). Many studies have been undertaken to establish the relationship between discrimination and future reading success. Results differ depending upon the population and the methods used in the investigations. Significant positive correlations between discrimination and future reading achievement range to .62 but most correlations are uniformly low (Durrell & Murphy, 1971; Dykstra, 1966; Morgan, 1971; Nila, 1953; Thackray, 1965). At the intermediate level, dis-

crimination correlated with most reading skills ranging from .19-.40 (Lester & Wheeler, 1954; Morency & Wepman, 1973).

Throughout the primary and intermediate grades low correlations were found between intelligence and discrimination (Deutsch, M., 1963; Dykstra, 1966; Lester & Wheeler, 1954; Wepman, 1960).

Results from studies investigating the relationship between auditory discrimination and reading with primary middle class subjects indicate significant differences in discrimination ability between retarded readers and those reading at or above grade level (Blank, 1968; Christine & Christine, 1964; Dykstra, 1966; Harrington & Durrell, 1965; Thompson, 1963; Wepman, 1960). Retarded readers exhibit significantly poorer auditory discrimination ability when compared with normal or above average readers.

Studies investigating the auditory skills of disadvantaged and ethnic groups are fewer in number but their results are more consistent. Results indicate that subjects from impoverished environments and ethnic minority groups perform more poorly on discrimination measures than disadvantaged white subjects (Arnold & Wist, 1969; Deutsch, C., 1972; Karger, 1973; Merrell, 1969). Children from ethnic minority groups and low socioeconomic groups achieve lower discrimination and reading scores than middle class subjects

(Arnold & Wist, 1969; Clark & Richards, 1966; Deutsch, C., 1972; Merrell, 1969). Another variable adversely affecting performance on discrimination measures is dialect (Fillyaw, 1975; Karger, 1973; Ross, 1974; Shaw, 1972; Wilcox, 1969).

Training investigations indicate that early identification of auditory discrimination deficiencies are accessible to remediation and result in adequate discrimination development (Axelrod, 1972; Durrell, 1966; Evans, 1971; Lewis, 1975; Valdes, 1971). Children with high initial scores in discrimination profit little from training while children with low initial scores make the greatest gains in development (Durrell & Murphy, 1953; Valdes, 1971). In general, studies have indicated that reading and reading readiness are not improved by auditory training (Axelrod, 1972; Kaleita, 1975; Roberts, 1975; Valdes, 1971). However, exceptions have been found (Evans, 1971; Lewis, 1975).

The literature is abundant with investigations in the many different areas of auditory discrimination but the important aspects pertaining to this investigation are that auditory discrimination is developmental and matures by the end of the primary years and correlates lowly with both reading readiness and intelligence. Finally, auditory discrimination can be improved through instruction depending upon the population and type of training program studied; however, reading readiness may or may not be.

CHAPTER III

PROCEDURE

The procedures governing the execution of this investigation and other relevant material are discussed in this chapter. The organization is as follows:

A) Experimental Design

B) Population

C) Selection of Tests

D) Administration of Tests

E) Training Program

F) Statistical Design

G) Summary

Experimental Design

The pretest-posttest control group design diagrammed below was selected as the model of this experiment.

$$R\ O_1\ O_2\ O_3\ X_1\ O_4\ O_5$$
$$R\ O_1\ O_2\ O_3\ X_2\ O_4\ O_5$$

Observations O_1, O_2, and O_3 were taken immediately prior to the treatment programs while the posttest observations,

O_4 and O_5 were taken immediately upon the completion of the programs. Observations O_1 and O_4 refer to the measures of auditory discrimination, O_2 and O_5 refer to the measures of reading readiness, and O_3 refers to the measure of intelligence.

The symbol R refers to the randomization procedure of the students participating in the study. For additional information concerning the procedure see Population. X_1 refers to the auditory training program while X_2 refers to the "story time" treatment given the control group.

Population

West End School in central New Jersey, where this investigation was conducted, is classed as a middle to uppermiddle class suburban school according to the 1976-1977 National School Lunch Program Family Income Scale. 4% of its 600 students are eligible to receive free or reduced-price milk and/or meals.

Kindergarten students were selected as the subjects of this investigation. The 87 white students were assigned to their teachers by random according to birth dates in the following manner: The birth dates of the children were recorded in descending chronological order with the oldest date at the top of the list and the youngest at the bottom. The dates were then alternately divided into two groups.

The mean chronological age for each group was 5.78 as of the first of January, 1977. Each group was then divided along the median and the two top halves were assigned to the afternoon sessions while the two lower halves were assigned to the morning sessions. The two female white teachers, both tenured with under ten years of experience, were assigned one morning and one afternoon session. The classes remained intact with their original instructor from their organization through the completion of the study.

Both the control and training groups consisted of one morning and one afternoon session. Intact classes were used. The total control population was 44 students. Similarly, the training sample consisted of 43 students. Each teacher instructed her own classes, one of which was designated as training and one as control. More specifically, Teacher A's morning class was a control group while her afternoon class was an training group. Teacher B's morning class was a training group while her afternoon class was a control group. The teachers themselves decided who would administer the training program to her morning class and who would administer the program to her afternoon class.

Students repeating kindergarten and those receiving corrective speech instruction were eliminated from the samples. Children failing both the initial and retest

state hearing tests were also eliminated. Any child who was absent from 1/2 of the auditory training lessons was also eliminated from the training sample. The final control group consisted of 33 students, 14 girls and 19 boys. The final training group consisted of 22 students, 12 girls and 10 boys.

Selection of Tests

A. Auditory Testing

The Wepman Auditory Discrimination Test, IA and IIA, evaluating the ability to perceive fine differences between similar sounding English words was chosen as the measure of auditory discrimination. (Forms IA and IIA may be found in Appendix A and Appendix B, respectively.) Forty word pairs matched for length, frequency, and phoneme placement were used; 10 of these as same word pairs. Of the 30 different word pairs 13 differ in the initial phoneme only (e.g., tin, pin), 13 differ in the final phoneme (e.g., tub, tug), and 4 differ in the medial phoneme only (e.g., pat, pet). Subjects are requested to respond by saying "same" or "different" or "yes" if the pair is the same and "no" if the pair is different. The test provides a quick, reliable (a test-retest coefficient of .91), and accurate assessment of auditory discrimination among children from 5 to 8 years of age (Buros, 1965). The obtained

raw scores were used in the calculations of the results.

B. Intelligence Measure

The SRA Tests of General Ability (TOGA), Form A K-2, was administered to all subjects. (This test can be found in Appendix C.) This group test contains two parts. Part I is a verbal section testing the child's familiarity with the world around him through his experiences in the school, in the home, and in the community. Part II presents geometric drawings designed to test the child's powers of abstract reasoning. TOGA is a carefully constructed measure of verbal intelligence without the use of test materials that are explicitly dependent upon school-learned skills such as reading, writing, and arithmetic. Its scores function much in the same way as other general intelligence test scores (Buros, 1965).

The TOGA technical report cites 20 reliability studies of total scores with coefficients ranging from .77 to .90 for the various levels. Correlations cited between TOGA total scores and those of other intelligence tests vary with the level being tested ranging from .41 to .80 (Buros, 1965). The obtained intelligence quotient was used in the calculations.

C. Reading Readiness

The Clymer-Barrett Prereading Battery, Forms A and B, were chosen to assess the reading readiness of the

subjects. (Forms A and B can be found in Appendix D and Appendix E, respectively.) Subtests of the battery include the recognition of letters, matching words, discrimination of beginning sounds, discrimination of ending sounds in words, shape completion, and copy-a-sentence. This test is equivalent to other reading readiness measures (Buros, 1972). The technical manual lists an odd-even reliability coefficient of .95 for first graders and split-half reliability coefficients for various special groups ranging from .96-.98 (Clymer, T. & Barrett, T.C., 1967). The composite raw scores were obtained and used in the calculations of the results.

Administration of Tests

During the weeks of December 6, 1976 through December 17, 1976 all kindergarten students were administered the standard New Jersey State Hearing Test using the Pure Tone Zenith Audiometer which was calibrated prior to the beginning of the study. The auditory acuity of each ear was scanned with a sweep from 500 cps. through 4,000 cps. at 20 dbs. A 10 decible loss in two frequency ranges resulted in failure. Any student who failed the initial acuity test was retested the following week and failure on that test resulted in elimination from either sample.

Parental permission slips (Appendix F) were issued to

each student during the week of December 20, 1976. Parents were asked to reply if they did not want their child to participate; no replies were received.

All pretest measures were administered during the weeks of January 3, 1977 through January 14, 1977. Children who missed any test due to absence were tested immediately upon their return to class.

Each student was individually administered Form IA of the Wepman Auditory Discrimination Test by a qualified examiner trained by the experimenter. Testing was conducted in a quiet room. Each student sat facing the examiner and participated in a pretest program (Appendix G) designed to test and/or train the student in the same-different responses required of the Wepman test. Testing did not commence until the examiner was confident the student understood the task. If at the conclusion of the pretest session the student failed to understand the task, he was eliminated from the study.

For the present study, the word pairs were prerecorded on tape to insure standardization of procedure and to avoid contamination by the varied speech characteristics of the different examiners. A bell was sounded to cue the student's attention. One second later the first word of the word pair was pronounced in a clear voice. The second word of the pair was pronounced in a clear voice after a

one second delay. 5 seconds were allowed for the student's response after which the bell was again sounded and the next word pair was spoken. 4 tapes were duplicated. The same procedure was used in the taping of Form IIB. The examiner operated the tape recorder. The tape was played once without stopping for each student.

The Wepman test was administered on January 5, 1977 by the experimenter and four research assistants who were trained in the use of the Wepman test and testing procedure prior to the test date. Students who were absent were tested upon their return to school.

The SRA Tests of General Ability, Form A was administered by the classroom teachers to their entire classes during the regularly scheduled class time. Part I was administered on January 6, 1977 while Part II was administered on January 7, 1977 according to the directions in the manual. Children who were absent were tested upon their return to class.

The Clymer-Barrett Prereading Battery, Form A was also administered by the classroom teachers to their entire classes during the regularly scheduled classes on January 10 through January 14, 1977 according to the directions in the manual.

Following the conclusion of the treatment programs the students were individually retested using Wepman's

Auditory Discrimination Test, Form IIb under the same conditions as the pretest on March 4, 1977.

Form B of the Clymer-Barrett Prereading Battery was administered to the students under conditions similar to those of the pretest (Form A) on March 7, 1977 through March 11, 1977.

Teachers were not permitted to see any results of the testing until the completion of the study.

Training Program

The program, "Auditory Training (For Individual or Classroom Work)" developed by Mary B. Miesner (M.A. Speech Pathologist; M.A. Learning Disabilities Teacher/Consultant) was used as the treatment for the two training groups. (The training program can be found in Appendix H.) The program was designed to train auditory discrimination and auditory memory. Areas emphasized in the program include a) the identification and discrimination of gross sounds; b) the identification and discrimination of animal sounds; c) the identification and discrimination of machine sounds; d) the identification and discrimination of sounds in the environment; in the classroom, out of doors, in the home, and weather sounds; e) the identification and discrimination of different tonal qualities; f) the identification and reproduction of sounds and rhythms; g) the identification

and discrimination of consonant and vowel sounds, and h) the development of auditory memory.

Each teacher was given a copy of the program sequence, activities, and suggestions. Materials were supplied by the experimenter and the classroom teachers. The teachers held daily conferences discussing their auditory training lessons, procedures, and presentation times to assure similarity between class instruction but some program individualization was allowed to accomodate for differences in class populations.

The program began on February 17, 1977 and concluded on March 3, 1977. A total of 30 lessons were presented. One group lesson lasting approximately 15 minutes was given to each training group each day. The control groups received a treatment of thirty 15 minute story periods including story discussions. Each control class received identical instruction with identical listening materials.

Statistical Design

Mean scores were reported for all pre- and post-tests. Gain scores were calculated for auditory discrimination and reading readiness and *t* tests were performed between mean gain scores for the training and control groups in each area of investigation. A level of .05 was selected for significance.

Summary

The pretest-posttest control group design utilizing a kindergarten population was selected as the model of the experiment. The population of 55 kindergarten children were white, middle to uppermiddle class, with the average age of 5.78 as of January 1, 1977. Pretest and posttest measures of auditory discrimination and reading readiness were obtained for each student. The Wepman Auditory Discrimination Tests were individually administered to each child in a quiet room. The Clymer-Barrett Prereading Battery and the SRA Tests of General Ability were group measures administered by the regular classroom teachers. Alternate forms were used.

Pretest and posttest means were compared to determine growth and t tests were performed to establish the significance of the results. A level of .05 was chosen for confidence.

CHAPTER IV

FINDINGS AND DISCUSSION

The purpose of this investigation was to explore the relationships between auditory discrimination, reading readiness, sex, and time of instruction for a white middle to uppermiddle class population of kindergarteners. In this chapter the relationships between these variables will be presented and discussed. The relation of the findings to the literature will then be discussed.

Findings Related to the Literature

At the conclusion of the training program, mean scores were determined for the test results of each treatment group in auditory discrimination, reading readiness, and intelligence. Appropriate pretest and posttest discrimination and readiness means were compared to determine growth. The intelligence means were also compared.

It was discovered that the groups differed in intelligence at the beginning of the study. Because of this finding, the two groups, in each comparison, could not be regarded as initially equal. A statistical test that takes the initial differences into account is based on the gain

scores of the participating subjects (Guilford, 1965). This statistical *t* test was used in the calculations.

Auditory Discrimination

The first null hypothesis governing this study stated that there would be no significant difference in the growth of auditory discrimination ability of the students who received auditory training and those who did not receive training. Auditory discrimination results can be seen in Table 1 on page 46 and intelligence results can be seen in Table 2 on page 47.

The training and control groups differed initially as can be seen by the following pretest results. The training group had an auditory discrimination mean of 21.36 and an intelligence mean of 116.31; whereas, the control group had an auditory discrimination mean of 20.82 and an intelligence mean of 104.82. At the conclusion of the training period the training group's posttest discrimination mean was 25.05 representing a gain of 3.6 points. The control group's posttest discrimination mean was 23.19; this group achieved a gain of 3.09 points in discrimination.

A *t* test comparing the gain scores was performed to establish the significance of the results. Each student's gain score in raw test points was used in the calculations. The *t* test (Table 1 on page 46) indicated no significant

TABLE 1

COMPARISONS BETWEEN SCORES OF TRAINING AND CONTROL GROUPS IN AUDITORY DISCRIMINATION

Treatment Group	Pretest Mean	S.D.	Posttest Mean	S.D.	Gain Score[a]
Training N=22	21.36	3.18	25.05	1.76	3.68
Control N=33	20.82	4.04	23.91	2.59	3.09

[a] t=.5385-not significant at the .05 level.

TABLE 2

COMPARISONS BETWEEN SCORES OF TRAINING AND CONTROL GROUPS IN INTELLIGENCE

Treatment Group	IQ	S.D.
Training N=22	116.32	13.66
Control N=33	104.82	20.15

difference in the gain scores between the training students and the control students (p=.05). Because no significant difference was discovered the first null hypothesis was accepted. Results indicated no significant difference in the growth of auditory discrimination ability of the students who received auditory training and those who did not receive training.

The second null hypothesis stated that there would be no significant difference in the growth of auditory discrimination ability between the male and female students who received auditory training. Auditory discrimination results are shown in Table 3 on page 49 and intelligence results can be seen in Table 4 on page 50.

The males had the lower discrimination mean of 20.70; whereas, the females had a discrimination mean of 21.58. The males, however, had the superior intelligence mean of 121.50; whereas, the females' mean was 112.00. Posttest results showed the males achieved a discrimination mean of 25.40, a gain of 4.70 points, and the females achieved a discrimination mean of 24.75, a gain of 3.17 points.

The t test between the male and female auditory discrimination gain scores was performed to establish the significance of the results. t test information can be seen in Table 3 on page 49. No significant difference in the growth of auditory discrimination ability was

TABLE 3

COMPARISONS BETWEEN SCORES OF MALE AND FEMALE TRAINING GROUPS IN AUDITORY DISCRIMINATION

Treatment Group	Pretest Mean	S.D.	Posttest Mean	S.D.	Gain Score[a]
Male N=10	20.70	3.53	25.40	2.01	4.70
Female N=12	21.58	2.61	24.75	1.55	3.17

[a] t=1.3935-not significant at the .05 level.

TABLE 4

COMPARISONS BETWEEN SCORES OF MALE AND FEMALE TRAINING GROUPS IN INTELLIGENCE

Treatment Group	IQ	S.D.
Male N=10	121.50	7.25
Female N=12	112.00	15.83

discovered (p=.05). The second null hypothesis was, therefore, accepted.

The third hypothesis stated that there would be no significant difference in the growth of auditory discrimination ability of the students who received training in the morning and those students who received training in the afternoon. Auditory discrimination results can be seen in Table 5 on page 52 while intelligence results may be seen in Table 6 on page 53.

The morning students showed a pretest discrimination mean of 20.27 and a posttest mean of 24.64, a gain of 4.36 points was achieved. This group had an intelligence mean of 114.09. The students who received training in the afternoon exhibited a higher pretest discrimination mean, 22.46, and a higher posttest mean, 25.46, but achieved a lower gain of 3.00 points. This group's intelligence mean was 118.55.

The third null hypothesis was accepted when the *t* test comparing the gain scores revealed no significant difference in the growth of the subjects (p=.05). *t* test results are shown in Table 5 on page 52. No significant difference in the growth of auditory discrimination ability between the morning and afternoon training groups was observed.

TABLE 5

COMPARISONS BETWEEN SCORES OF MORNING AND AFTERNOON TRAINING GROUPS IN AUDITORY DISCRIMINATION

Treatment Group	Pretest Mean	S.D.	Posttest Mean	S.D.	Gain Score[a]
Morning N=11	20.27	3.74	24.64	1.86	4.36
Afternoon N=11	22.46	2.16	25.46	1.64	3.00

[a] t=.2467-not significant at the .05 level.

TABLE 6

COMPARISONS BETWEEN SCORES OF MORNING AND AFTERNOON TRAINING GROUPS IN INTELLIGENCE

Treatment Group	IQ	S.D.
Morning N=11	114.09	14.05
Afternoon N=11	118.55	12.79

Reading Readiness

The fourth null hypothesis stated that there would be no significant difference in the growth of reading readiness between the students who received auditory training and those students who did not receive training. Reading readiness results are shown in Table 7 on page 55 and intelligence results are shown in Table 2 on page 47.

The training group had a pretest readiness mean of 85.46 and a posttest readiness mean of 97.59 gaining 12.14 readiness points. As was previously stated, the mean intelligence of the training was 116.34. The control group began with a higher readiness pretest mean of 87.58 but achieved a lower posttest mean of 94.18. This represented a gain of 6.61 readiness points-a smaller gain than the gain of the training group. The control group's intelligence mean was 104.82.

The *t* test comparing the gain scores revealed no significant difference in the gain scores of the two groups ($p = .05$). Results can be seen in Table 7 on page 55. The fourth null hypothesis was accepted when no significant difference in the growth of reading readiness was found.

The fifth null hypothesis stated that there would be no significant difference in the growth of reading readiness when the male and female training groups were compared. Reading readiness results can be seen in Table 8 on page 56

TABLE 7

COMPARISONS BETWEEN SCORES OF TRAINING AND CONTROL GROUPS IN READING READINESS

Treatment Group	Pretest Mean	S.D.	Posttest Mean	S.D.	Gain Score[a]
Training N=22	85.46	14.69	97.59	11.23	12.14
Control N=33	87.58	17.77	94.18	17.07	6.61

[a] t=1.8868-not significant at the .05 level

TABLE 8

COMPARISONS BETWEEN SCORES OF MALE AND FEMALE TRAINING GROUPS IN READING READINESS

Treatment Group	Pretest Mean	S.D.	Posttest Mean	S.D.	Gain Score[a]
Male N=10	79.10	13.69	95.90	9.06	16.80
Female N=12	90.75	13.83	99.00	12.99	8.25

[a] t=2.1251-significant at the .05 level.

and intelligence results can be seen in Table 4 on page 50.

The female training group with the lower intelligence mean (112.00) achieved a gain of 8.25 reading readiness points. Its pretest mean was 90.75 and its posttest mean was 99.00. The male training group began its training period with a lower mean of 79.10 readiness points and concluded with a readiness mean of 95.90. A superior gain of 16.80 readiness points was achieved. The males's intelligence mean was 121.50.

The t test comparing gain scores showed a significant difference between the gain scores at the .05 level of confidence. The t test results can be seen in Table 8 on page 56. Therefore, hypothesis five which stated that there would be no significant difference in the growth of the reading readiness of the male and female students who received training, was rejected.

The final hypothesis stated that there would be no significant difference in the growth of reading readiness of the students who received training in the morning and the students who received training in the afternoon. Reading readiness results can be seen in Table 9 on page 58 while intelligence results are shown in Table 6 on page 53.

The children who received training in the morning began the training program with a pretest mean of 81.09

TABLE 9

COMPARISONS BETWEEN SCORES OF MORNING AND AFTERNOON TRAINING GROUPS IN READING READINESS

Treatment Group	Pretest Mean	S.D.	Posttest Mean	S.D.	Gain Score[a]
Morning N=11	81.09	10.55	95.36	8.03	14.27
Afternoon N=11	89.82	17.32	99.82	13.76	10.00

[a] t=.9863-not significant at the .05 level.

and an intelligence mean of 114.05. The children who received training in the afternoon began the program with a higher pretest mean of 89.82 and a higher intelligence mean of 118.55. At the conclusion of the program, the morning group achieved a posttest readiness mean of 95.36 gaining 14.27 points. The afternoon group achieved a posttest readiness mean of 99.82 gaining 10.00 points-a smaller gain than the gain of the morning group.

The t test comparing gain scores revealed no significant difference in the scores of the two groups (p=.05). The t test results can be seen in Table 9 on page 58. The sixth null hypothesis was accepted when no significant difference in the growth of reading readiness was found between the morning and afternoon students who received auditory training.

Relation of Findings to the Literature

Most of the literature research concerning auditory discrimination has been found to be correlational in nature and the training studies which have been undertaken vary greatly in both population and method.

The most relevant training study pertaining to this investigation was that by Kaleita (1975). Here, the Auditory Discrimination in Depth Program (ADD) was used with kindergarten students who met established criteria

for poor auditory discrimination performance. Significant improvement in auditory discrimination by the training group was reported. The findings of the current study differ with those of Kaleita. This experimenter found no significant differences in auditory discrimination after training; however, most of the students participating in the study, unlike those in Kaleita's, had adequate discrimination for their age.

The findings of the present study were similar to those of Harckham and Hagen (1970), who used a kindergarten phonics program, and to those of Evans (1971), who used a planned kindergarten physical education program on auditory discrimination ability, verbal and nonverbal, and a sequential classroom auditory training program. As in the present study, no significant differences were reported.

Among economically depressed kindergarten children participating in a training study by Valdes (1971) no significant differences were reported. Similarly, no significant differences were found by Williams (1973) who compared Black and Mexican-American first graders. Low socioeconomic first graders who received taped auditory training instruction made significant improvement in discrimination. In another study a taped program of phonics instruction yielded similar results (Axelrod, 1972). Finally, low achieving, early elementary, predominately Black children

made superior gains in discrimination ability after training (Lewis, 1975).

Evans (1971) reported no sex differences for verbal discrimination but found girls exhibited significantly greater changes in the classroom training program for non-verbal discrimination. In the present study, neither sex was found to have made superior gains in auditory discrimination. Williams (1973) in his training study of economically disadvantaged first grade Black and Mexican-American children and Moe's (1972) study comparing a "structured" and an "unstructured" kindergarten program found no sex differences.

A study by Harckham and Hagen (1970) found that a phonics training program for kindergarten students did significantly improve reading readiness. Unlike their results, the findings of the current study showed that there was no significant difference in the growth of reading readiness of the students who received auditory training and those who did not receive training.

Kaleita's (1975) Auditory Discrimination in Depth Program (ADD) failed to yield significant improvements in reading readiness for kindergarten students. Significant improvement also did not occur when an auditory training program was used with economically disadvantaged kindergarten students (Valdes, 1971). Axelrod (1972) found that

taped phonics lessons and taped auditory perceptual training yielded significant gains in discrimination but no significant gains in reading readiness.

At the first grade level, Williams (1973) also found no significant improvement in the reading readiness achievement of Black and Mexican-Americans who participated in a phonics reading program, a visual linguistic reading method, and a visual linguistic reading method including auditory discrimination training.

No training studies were found which dealt with sex differences in reading readiness at the kindergarten level. At the first grade level, Williams (1973) found no significant differences between Black and Mexican-American males and females. The present study found superior significant growth was made by the male training group.

A search of the literature did not reveal any studies which analyzed the effects of the time of the day auditory instruction is given. However, as was shown in this study, these variables produced no significant differences in the growth of either auditory discrimination or reading readiness.

Discussion

Several variables may have affected the results of this study. The 30 training sessions were interrupted

by a three-day mid-winter recess as well as the closing of school for one day due to inclement weather. Perhaps a consistent day to day training period with no interruptions would have yielded different results.

The daily time alloted for training and the duration of training may also have influenced the results. These two variables differed greatly in the literature. In other studies where significant growth did occur greater time was alloted for training.

The types of training programs reviewed and their populations also varied considerably, making comparisons with this study difficult.

The sample size of this study differed with many of those in the literature. The instruction in this present study was to groups of approximately 20 subjects at a time. Lewis (1975) who worked with low achieving, early elementary Black children achieved somewhat different results in that his group significantly improved in both auditory discrimination and academic achievement. Instruction was given to groups with no more than ten students, four days per week and 90 minutes each day, and devoted equal blocks of time to auditory skills, verbal skills and language development.

CHAPTER V

SUMMARY, CONCLUSIONS, AND SUGGESTIONS FOR FURTHER RESEARCH

This chapter will summarize the results of the investigation, draw conclusions from these results, and offer suggestions for additional research.

Summary

The purpose of this investigation was to evaluate the effects of a systematic auditory training program upon the auditory discrimination ability and reading readiness of kindergarten students. An evaluation of these effects was also made for groups arranged according to sex and time of the day instruction was given.

Fifty five white middle to uppermiddle class kindergarten students randomly assigned to their classes participated in the study. Each student was individually pretested using the Wepman Auditory Discrimination Test, Form IA. The Clymer-Barrett Prereading Battery, Form A, and the S.R.A. Tests of General Ability, K-2, Form A were administered as group tests by the classroom teachers.

Twenty two students received thirty 15 minute auditory training lessons following the method and procedures described in "Auditory Training (For Individual and Classroom Work)" developed by Mary B. Miessner. Lessons were taught by the classroom teachers. The 33 control subjects received thirty 15 minute story periods. Upon the conclusion of the training program each student was individually administered Form IIA of the Wepman Auditory Discrimination Test; Form B of the Clymer-Barrett Prereading Battery was administered to the total class groups.

t tests were performed to establish the significance of the results. Each student's gain score in raw test points was used in the calculations. A level of .05 was chosen for confidence.

No significant difference in the growth of auditory discrimination ability was found between the total training and control groups. Similarly, no significant difference in auditory discrimination ability growth was found when the male and female training groups were compared. When the discrimination results were analyzed according to the time of the day when the instruction was given no significant difference was found between the morning and afternoon training groups.

Results also indicated no significant difference in the growth of reading readiness between the total training and control groups. A significant difference was discovered when the male and female training groups were compared; the males made superior gains in reading readiness. Finally, no significant difference in reading readiness growth was detected when the morning training group was compared with the afternoon training group.

Conclusions Regarding Hypotheses

The initial results of this investigation do not support the expectation that auditory training improves the auditory discrimination ability of middle class kindergarteners. No significant difference was discovered in the growth of auditory discrimination ability when the gain scores of the control and training groups were compared.

In general, research had indicated that auditory training using various methods has improved the discrimination ability of many selected populations (Axelrod, 1972; Evans, 1971; Kaleita, 1975; Lewis, 1975; Silvaroli & Wheelock, 1966; Valdes, 1971). The initial results of this study differ with the general research but agree with the results of Harckham and Hagen (1970) and Roberts (1975).

No significant difference in the growth of auditory discrimination was found between the total training and control groups in the current study and those of Harckham and Hagen (1970) and Roberts (1975). Differences in all the studies cited may have been due to varying statistical designs and/or instructional procedures.

The apparent lack of superior improvement in auditory discrimination ability at the conclusion of this study's training program may have been due to the satisfactory to above satisfactory discrimination level and adequate language background of the students participating in the study. Most of the students had an adequate discrimination level for their age. Different results may have been achieved if the population studied exhibited an unsatisfactory discrimination level. Kaleita (1975) discovered that auditory discrimination could significantly be improved through instruction based on the Auditory Discrimination in Depth Program (ADD) using kindergarten students who met the established level of poor discrimination performance.

The discovery of no significant improvement in auditory discrimination ability of the total training and control groups seems to indicate that specialized auditory training was not profitable and did not improve discrimination ability.

No significant difference in the growth of auditory discrimination was detected when the male and female training groups were compared at the conclusion of the training program. This finding is in agreement with those reported by Williams (1973) who discovered no sex differences but differed with those reported by Evans (1971) who found that girls achieved a significantly greater degree of growth with auditory training. It may be concluded that neither males nor females will make superior growth in auditory discrimination ability due to auditory training.

Another outcome of this investigation was the discovery that no significant difference in the growth of auditory discrimination ability was observed when the gain scores of the morning and afternoon training groups were compared. It may be concluded that the time of the day that auditory training is given does not affect the outcome of the results.

When the reading readiness test results were analyzed, it was found that no significant difference in the growth of reading readiness occured between the total control and training groups. This finding is in agreement with the results found by Axelrod (1972), Kaleita (1975), and Valdes (1971). It is apparent that auditory training does not further develop the reading readiness skills of white

middle to uppermiddle class kindergarten students. It is possible that the skills emphasized in the auditory training program are not those necessary to increase reading readiness.

A significant difference in reading readiness growth was discovered when the male and female training groups were compared. The males achieved superior growth; however it should be remembered that their intelligence mean of 121.50 was superior to the intelligence mean of the females (112.00) and may account for the superior growth.

Finally, no significant difference in reading readiness was detected when the morning and afternoon training groups were compared. Again, each group profited from auditory training; however, neither group excelled in growth. It should be remembered that auditory training did not significantly improve the reading readiness of the total training group when it was compared with the total control group. It can be concluded from the results that the time of the day auditory training instruction is given does not affect the growth of reading readiness.

It appears to be the case that when middle class white children come to school with adequate language backgrounds, average intelligence, and adequate or above average discrimination no specialized auditory instruction is

needed.

Suggestions for Further Research

This section will offer suggestions for further research on the effects of auditory training in the areas of auditory discrimination, reading, and reading readiness.

1. Replication of this study with a larger population is suggested. While the initial control and training groups consisted of 44 and 43 students, the final groups consisted of 33 and 22 students which represented a small proportion of white middle to uppermiddle class kindergarten students. Subgroups studied in this investigation were also small. Larger control and training groups would make generalizing the results and conclusions more applicable to the larger general population and would allow the study of additional variables.

2. It is also suggested using different populations to determine if the training program would benefit groups based on low socioeconomic status or race. Utilizing groups identified as poor in discrimination ability would also be appropriate.

3. An investigation of the effects of auditory training of preschool, 1st grade, special education, and remedial students might yield different results in the

areas of auditory discrimination, reading, and reading readiness.

4. Further study with males may determine whether the gain scores achieved by the male training group in reading readiness were reliable. Further investigation of sex differences may be warranted.

5. Extending the time and duration of the training program is also recommended. Increasing the number of sessions may produce a substantial difference when the total control and training groups are compared. It is also recommended that the program be run in the spring or fall to lessen the necessity of eliminating subjects due to illness.

6. Studying the effects of this training program in other kindergarten classes using alternate or no methods of beginning reading instruction will increase the knowledge of the program's effectiveness. The children participating in this investigation were given beginning reading instruction using the Initial Teaching Alphabet (I.T.A.) which utilizes a great deal of auditory discrimination skills. A sight word, linguistic, or programed reader approach to reading may yield different results.

7. Study of the program's effectiveness when taught on an individual or small group basis to children deficient

in auditory discrimination skills would increase our knowledge of the benefits of this specific program and the knowledge in the field of auditory training.

Auditory discrimination has been researched for many years but the area of auditory training is a relatively new field. The effectiveness and consequences of auditory training on discrimination, reading, and reading readiness remains a debated question. It is hoped that this investigation has added some significant information to the field of auditory discrimination.

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APPENDIX A

AUDITORY DISCRIMINATION TEST

FORM IA

APPENDIX B

AUDITORY DISCRIMINATION TEST

FORM IIA

APPENDIX C

TESTS OF GENERAL ABILITY

FORM A, GRADES K TO 2

APPENDIX D

CLYMER-BARRETT PREREADING BATTERY

FORM A

APPENDIX E

CLYMER-BARRETT PREREADING BATTERY

FORM B

APPENDIX F

PERMISSION SLIP

Tests removed by author.

WEST END SCHOOL

Office of the Principal

12/20/76

Dear Parents,

One of our first grade teachers, Miss Mustard, is currently enrolled in the reading specialization program at Rutgers University and is engaged in completing a research program to fulfill the requirements of a master's degree. The research study focuses on auditory discrimination and its effects upon reading readiness.

We are asking the cooperation of all the kindergarten students in the study. This will require ten minutes of testing per child out of his classroom on Wednesday, December 22, 1976 and on another day in March. Your child's name and performance will be kept anonymous at all times and will in no way affect his classroom grades or future placement.

Should you be interested, a copy of this study will be available in the office in June.

If you do <u>not</u> want your child to participate, please

indicate below and return the slip to your child's teacher.

Respectfully,

Peter G. Fagone

I do <u>not</u> wish my child,_____,
to participate in the foregoing program.

Date: 12/21/76 Signature of Parent:_____

APPENDIX G

AUDITORY PRETEST

AUDITORY PRETEST

Test each child individually.
Seat the child facing the examiner.
The examiner operates the tape recorder.

1. We are going to play a game. It's called "same or different".
   (Show the child two blocks-both red.)
2. Here are two blocks. Can you tell me if these are same or if they are different?
   (Show a red and a blue block.)
3. How about these. Are they the same or are they different?
   (Show two blue blocks.)
4. Here are two more. Are these the same or different?

If the child gave two incorrect answers discontinue the test and send the child back to class.

5. We can play the same game with words. I am going to say two words. Tell me whether they are the same or if they are different words. Listen carefully.

Here are the two words: MAN-MAN. Were they the same or different? Let's try another pair.

(Continue with the following practice word pairs.)

6. PASS-PATH DOG-HOG WALK-WALK

If the child gave two incorrect answers discontinue and return him to his class.

7. Now we are going to listen to a tape. A bell will ring to say "listen carefully". Then you will hea- two words. Tell me whether they are the same or if they are different. Do you have any questions? I can not tell you any answer or help you when the tape starts.

APPENDIX H

AUDITORY TRAINING

(For Individual or Classroom Work)

Mary B. Miessner

Before a child learns to talk, read, or write, he hears gross, specific, and blended sounds and associates them with his experiences. In order to verbally or visually discriminate the differences in sounds and their written symbols, he must be able to differentiate them auditorily.

Some children skip portions of the steps in auditory training and although their speech is adequate, they have difficulty in following complicated directions and/or associating the written symbols (reading) with the various sounds.

It is suggested that the child who has a problem in reading and/or in following detailed verbal directions be given an auditory discrimination test by a qualified examiner. When numerous errors are made by the student, the examiner will suggest that an evaluation of the child's hearing be made by an audiologist. If there is no specific hearing problem, then auditory training should be initiated.

It must be emphasized that each step in the following

lesson plans be completely mastered before proceeding to the next lesson. The steps under the ACTIVITIES are in the order they should be presented. All of these steps should NOT be given at one time.

There is no need to set aside a daily half-hour or more to do this work. It is more beneficial to have a five minute break several times a day, between basic subjects. As the classroom teacher becomes more familiar with the techniques she/he will find that some of the activities can be carried over into mathematics, science, reading, social studies, etc.

SUGGESTED PLANS FOR AUDITORY TRAINING

I. Identification and discrimination of gross sounds.

A. Materials.

Drums, bells, horns, whistles, records, etc.

B. Activities

1. The child identifies the object when he hears the sound, without being able to see the item.
2. Contrast large drum sound with small drum sound. Do the same with other items.
3. Contrast the sound of three different

drums, three different bells, etc.

4. Have the child make or bring in different items for additional identification and discrimination.
5. Use the record, "Sounds Around Us"-Scott Foresman, or other records which have a variety of sounds such as sirens, trains, boats, cars, running water, etc.

C. Suggestions.

1. Do not use animal or vocal sounds at this time.
2. Always start with identification of one sound and slowly build up to several.
3. Be sure that the youngster has no difficulty with the first step before going on to the next one.
4. Ditto work can be used for all of the activities. Pictures to color, or mark, writing the sound, use of words instead of pictures. Adapt the material to your class.

D. Teacher Comments:

II. Identification and discrimination of animal sounds.

A. Materials.

Records, tapes, instructor's voice, child's voice.

B. Activities.

1. The child identifies animal when he hears it's specific sound.
2. The child identifies two animal sounds he hears.
    a. Start with distinctly different types such as: cow (moo)-chick (peep) and gradually work up to the hard to discriminate sounds such as sheep (baa)-goat (maa).
3. Say three animal sounds (two the same and one different). The child identifies the one that is different.
4. Say three animal sounds. The child tells whether the first, second, or third was different.
5. Use any records that have man-made animal sounds and have the child identify them.
6. Use any record that has natural animal

sounds. (This is most difficult in discrimination as many children have not actually seen or heard some of the animals.)

C. Suggestions.

1. Animal and bird sounds:
   cow-moo, horse-neigh, pig-oink, sheep-baa, goat-maa, lion-rrr, crow-caw, large dog-woof (deep tone), small dog-yap (high tone), angry dog-grr, frightened dog-whimper, hungry cat-meow, contented cat-purr, angry cat-fff, donkey-hee haw, hen-cluck, rooster-R-R-R-R, baby chick-peep, duck-quack, etc.
2. Other animal sounds may be used if so desired.
3. The child can bring in pictures or replicas of the animals and use them for displays, etc.
4. A scrap book can be started at this time by the child on the animals and their sounds.

D. Teacher Comments:

III. Identification and discrimination of machine sounds.

A. Materials.

Boats, trucks, cars, trains, planes, motor bikes, etc.

B. Activities.

1. The child identifies the machine when he hears the sound.
2. The instructor shows a machine and the child listens to several machine sounds and identifies the one that belongs.
3. Discuss the differences between animal and machine sounds.
4. Follow same procedure as when presenting animal sounds.

C. Suggestions.

1. Add a new section to the scrap book on machine sounds.
2. Ditto work can also be used as suggested in gross sound section.

D. Teacher Comments:

IV. Identification and discrimination of sounds in the environment: in the classroom, out-of-doors, in the home, weather sounds.

A. Materials.

Records, tapes, pictures.

B. Activities.

1. Child listens and discusses the sounds he hears around him and detects the source and direction of the sound.
2. The child might reproduce some of these sounds and the others try to identify them.
3. The child identifies his classmates' voices. The game, "Who's Got the Bone", might be utilized for this.
4. Pictures can be added to the scrapbook.
5. Ditto sheets with pictures can be used.

C. Suggestions.

This section fits in very well with much of the social studies work and some of the science work.

D. Teacher Comments:

V. Identification and discrimination of different tonal qualities.

A. Materials.

1. Any of the materials previously used in I through IV.

2. Piano, musical instruments, rubber bands, etc.

B. Activities.

1. The child listens and identifies the sounds of instruments or objects that are loud or soft.
2. The child identifies loud and soft voices.
3. He listens and identifies high and low sounds.
4. He listens and identifies fast and slow sounds.
5. Additional ditto material can be used.
6. Add pictures to the scrapbook.

C. A science experiment: Put two or three different size rubber bands around a box. Pluck each rubber band and listen to sound. Tighten each band and hear the change in pitch to higher tones. Discuss how our voices change in pitch as the vocal cords tighten or relax.
Each child can make and decorate his own box and perhaps a new musical instrument might be the result.

D. Teacher Comments:

VI. Identification and reproduction of sounds and rhythms.

A. Materials.

Records or tapes.

B. Activities.

1. Instructor taps out rhythm. Child imitates.

a. Rhythms should be simple at first and gradually made more difficult. i.e.

. . .

. . ...

.. . . .

.... etc.

2. Instructor taps out a familiar tune and child identifies the tune.
i.e. America, Star Spangled Banner, any song the child knows well.

3. The child listens to music, then marches, runs, etc. as rhythm of music indicates.

C. Suggestions.

1. For older children work on the Morse code can be a meaningful challenge and a lot of fun for them.

D. Teacher Comments:

VII. Identification and discrimination of consonant and vowel sounds.

A. Materials.

Pictures, plastic or wooden alphabet letters, alphabet cards in manuscript or cursive, etc.

B. Activities.

**********PLEASE NOTE: Never say the letter name when talking about the sound of the letter.

Isolated Sounds

1. The instructor makes the sound. The child imitates it and feels where the sound is made. Mirrors may be used.
2. The instructor says two sounds (then 3 and 4) and the child identifies the correct sound (first, second, etc.)

Initial Sound

3. Say two words (then 3 and 4) and the child identifies the word (first, second, etc.) that starts with the sound being studied.
4. Say a sentence with the sound in the initial position in one word and the child names the word.

5. Increase the number of words in the sentence with the specific sound. The child tells how many he has heard.
6. Use poetry or stories, doing the same thing with each sentence.
7. When the child has no difficulty with this section, then read a paragraph and he tells how many words began with the specific sound.

Final Sounds

8. Go back to #3, but now the sound is in the final position of the word. Continue through #7.

Medial Sound

9. Follow #3 through #7 with the sound in the medial position.

All Positions

10. Follow same order as for initial, final, and medial positions.
11. See "Suggested Listening Games for the Classroom" for ideas on your grade level to reinforce this work.
12. Go to next sound and follow routine from #1 through #11.

Blends

13. Follow same procedure.

C. Suggestions.

1. When first introducing the sound being studied, let the child see your lips as you make the sound. As he becomes more apt at hearing the sound, either cover your mouth or stand in back of the room so that he must listen more carefully in order to identify the sound.
2. Do not over-emphasize the movement of your lips or the word in the sentence. Keep it natural, but clear.
3. The sounds are listed in the order as suggested in the Kindergarten Speech Program of "Listen to Me".
   p-b, t-d, m-n, h, w, wh, f-v, k-g, l-r, s-z, silent th-voiced th, sh, ch, j.

D. Teacher Comments:

VIII. Developing Auditory Memory.

A. Materials.

B. Activities.

Directions

1. Instructor gives single direction and

child does as told.

2. Instructor increases number of directions until the child has no difficulty in following 1, 2, or 3.
   i.e. (1) Stand. (2) Stand and touch your ear. (3) Stand and touch your ear and hum.
3. Review directions to be followed during a fire drill and have child repeat them and act them out.

Rote

4. Instructor says a word and child repeats it.
   a. When child is adept at this, go on to phrases, sentences, stories, and ideas.
5. Learn nursery rhymes, poems, and songs by rote.
6. Dramatize simple plays.
7. Use suggested listening games or make up your own.

Information

8. Instructor makes an announcement and tells where, when, what, who, etc.
9. Read a brief story and child identifies:

a. Color words in story.

b. Number words in story.

c. Action words in story.

10. This work can be developed as far as you wish with your particular grade.

Pleasure

11. Listen to music, story film and describe, dramatize, do art work to show actual events, or the feeling of the activity.

12. Instructor omits words, then phrases in a direction or a story and the child supplies the correct words.

13. Choral speaking involving the whole class with individual solo parts.

Evaluation

14. The child tapes his voice and evaluates the pitch, enunciation, volume, phrasing, and sentence structure.

15. The child listens and identifies the true or false parts of a sentence or a story.

16. The child listens and identifies the funniest, the happiest, the saddest, etc. parts of the story.

17. The instructor tells part of a story

and the child completes it in a happy, tragic, funny, etc. mood.

D. Teacher Comments:

If this material has been followed carefully, varying each step as it pertains to your class and being certain that each child is successful before going on to the next step, there should be a marked improvement in each youngster's ability to listen and perform. Basic skills in reading should show evidence of a carry-over of this work if there are no other deficiencies.

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